Final Report on NASA Grant NAG5-2374

EUV Spectroscopy of Hercules X-1

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EUVE made possible for the first time observations of Her X-1 in the lower energy range of the strong soft component. Several X-ray pulsars show this component, but owing to the high galactic latitude and correspondingly low interstellar absorption towards Her X-1, it is the *only* X-ray binary system that EUVE is able to study. Since the emission in this band is likely to be due to reprocessed higher energy X-rays and since Her X-1 has strong, highly variable emission over many wavelengths, it was thought essential to complement the EUVE observations with simultaneous coverage in several wavebands. Five satellites and four ground-based observatories were used presenting a comprehensive view of emission from ionized material in several different environments ranging from the inner edge of the accretion disk to the magnetosphere and corona.

The EUVE observations took place over four days during the main-on state of the 35-day cycle. The EUVE count rates (taken from the Deep Survey which has greater sensitivity than the spectrometer observations) showed a time dependence similar to that of the soft X-rays. The unusual low state of Her X-1 during our observations resulted in spectra of very low signal-to-noise ratio from the EUVE Short Wavelength Spectrometer. Continuum emission was detected but no line emission. A blackbody fixed at a temperature of 0.1 keV (the ROSAT value) provides a good fit. Because of the weak signal, small systematic errors in the background severely affect the continuum modelling. We have only recently completed a recalibration of the EUVE effective area function which is needed for a proper interpretation of the off-axis spectral data. This new calibration was obtained from examining the off-axis and on-axis spectra of HZ 43, a hot, nonvariable white dwarf, and is being prepared separately for publication (Marshall and Dupuis). The results will be applied to a paper doing more sophisticated background and continuum modelling is currently underway.

To date a total of seven papers and conference reports have been published utilizing data obtained in connection with this grant. An eighth paper is in preparation.

1993 Multiwavelength Observations of Hercules X-1 (S.D. Vrtilek, P. Charles, E. Hu, P. Kahabka, H. Marshall, T. Mihara, F. Primini, R. Rutten, Y. Soong, J. Stull, & W. Voges). Evolution of X-ray Binaries, College Park, MD, Oct 11-13, 1993.

1993 Simultaneous Multiwavelength Observations of Hercules X-1 (S.D. Vrtilek, P. Charles, E. Hu, P. Kahabka, La Dous, C., H. Marshall, T. Mihara, F. Primini, R. Rutten, Y. Soong, J. Stull, J. Truemper, W. Voges, R. Wagner, & R.M. Wilson, *B.A.A.S.*, 25, 1346.

1994 Multiwavelength Observations of Her X-1: A Simultaneous Look at 4 Decades of the Spectrum (S.D. Vrtilek, P.A. Charles, K.O. Dennerl, E. Hu,P. Kahabka, C. la Dous, H. Marshall, T. Mihara, F.A. Primini, J.C. Raymond, R. Rutten, Y. Soong,J.

Stull, J. Trümper, W. Voges, R. M. Wagner, R. Wilson). IAU Symposium 165, Aug 15-19, 1994. The Hague, Nederlands.

1994 Multiwavelength Observations of Hercules X-1/HZ Herculis S.D. Vrtilek *et al.*), *ApJLetters*, **436**, L9.

1995 An Improved X-ray Heating Model for Her X-1 (F.H. Cheng, S.D. Vrtilek, & J.C. Raymond), IAU Colloquium 158, June 15-30th, Keele, England.

1995 Accretion Disk Dynamics of Her X-1 (S.D. Vrtilek), in proceedings of IAU Colloquium 158, June 15-30th, Keele, England.

1996 The UV/Optical Continuum of Her X-1/HZ Her (S.D. Vrtilek & F.H. Cheng), ApJ, 465, July 10, 1996 issue.

1996 EUVE Observations of Her X-1/HZ Her (H. Marshall, S.D. Vrtilek, & J.C. Raymond), in preparation.